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(54) Title: SYSTEM AND METHOD FOR DISPLAYING THE LOCATION OF A WIRELESS COMMUNICATIONS DEVICE

(57) Abstract: A system and method for displaying the current street address on the display of a mobile wireless communications device. The longitude and latitude of the device is determined by a system such as GPS and triangulation. This information is appended to the URL of a Web server, and a browser contained within the wireless device navigates to the server. The server performs reverse geocode processing on the longitude and latitude to compute the corresponding street address. The street address is then sent to the wireless device for display.

SYSTEM AND METHOD FOR DISPLAYING THE LOCATION OF A WIRELESS COMMUNICATIONS DEVICE

Background of the Invention

1. Field of the Invention

The present invention relates generally to wireless communications and, more particularly, relates to a system and method for displaying the location of a wireless communications device.

2. Related Art

The advent of wireless personal communications devices has revolutionized the telecommunications industry. Cellular, personal communications services ("PCS") and other services provide wireless personal communications to businesses and individuals at home, in the office, on the road, and to any other location the wireless network can reach. Wireless telephone subscribers no longer must use public telephones along the road or wait until returning to the home or office to check messages or to return important business calls. Instead, wireless subscribers can carry out day-to-day business from the privacy of an automobile, from a remote job site, while walking along the airport concourse, and anywhere else that a personal communications signal is accessible.

Thus, it is no surprise that since the introduction of the cellular telephone service, the number of wireless telephone subscribers has increased steadily. Today, there are a staggering number of wireless telephone subscribers whose ranks are growing rapidly. In fact, many households have multiple wireless telephones in addition to their conventional land line services.

With a market of this size, there is fierce competition among hardware manufacturers and service providers. In an attempt to lure customers, most providers offer handsets with desirable

features or attributes such as small size, light weight, longer battery life, speed dial, and the like. Many recent additions to the marketplace include multi-functional handsets that even provide pocket organizer functions integrated into the wireless handset. Most manufacturers, however, are still scrambling to add new features to their communications devices to snare a portion of this booming market.

One way in which new features are added to wireless communication devices is by integrating the devices into the Web. Such integration allows the countless services available through the Web to be extended to wireless communications devices. Traditional web pages, however, usually contain too much information to be presented on the typically smaller display of a wireless communication device, such as a digital cellular telephone. To address this problem, new Web based programming languages such as the Handheld Device Markup Language ("HDML") have been developed to serve the wireless market. In serving the wireless market, HDML has evolved and is sometimes called the Wireless Markup Language ("WML"). This language, which will be referred to herein as HDML/WML, is part of a larger standard called the Wireless Application Protocol ("WAP"). WAP is a result of continuous work to define an industry wide standard for developing applications over wireless networks. The WAP forum was formed to create a global wireless protocol specification that works across differing wireless network technology types for adoption by appropriate industry standards bodies.

HDML/WML is a markup language intended for use in specifying content and user interfaces for narrow bandwidth ("narrowband") devices, including cellular phones, pagers, and personal digital assistants ("PDA"). HDML/WML was designed with the limitations and constraints of these narrowband, small screen devices specifically in mind. Some of these constraints include a smaller display and limited user input facilities, a narrowband network connection and limited

memory and computational resources.

Though HDML syntax is similar to HTML (Hypertext Markup Language) syntax, HDML is not a true markup language. It is a set of commands or statements that specifies how a narrowband device interacts with a user. HDML applications display information on the handset display and specify how the handset responds to user input. The text presentation and layout area is tailored to the smaller display area typical to a narrowband device. A "card and deck" organizational structure is used whereby all information is organized into a collection of screen sized cards, each of which specifies a single interaction between the handset and user. A deck contains one or more cards. HDML supports several types of cards, including entry cards, which display a message and allow the user to enter a string of text; choice cards, which display multiple options from which the user can choose one; and display cards, which display information only. Inter-card navigation and linking is supported for managing navigation between cards and decks. String parameterization and state management allow the use of state models to add parameters to decks.

Today, HDML/WML offers an efficient means of providing content and services from the Web infrastructure to wireless handheld devices such as cellular phones, pagers, and PDAs. Another useful feature associated with some wireless communication devices is the Global Positioning System ("GPS"). A GPS receiver in or associated with the wireless device communicates with a constellation of GPS satellites to determine the precise location of the device in terms of global latitude and longitude. This information may also be obtained using other systems such as a triangulation system. However obtained, location in terms of latitude and longitude is typically not helpful to the operator of a wireless communication device.

Summary of the Invention

The present invention uses the existing infrastructure of a wireless HDML/WML browser to send latitude and longitude information from a wireless handset to a remote Web server. The Web server processes the latitude and longitude and returns the handset location for display in a format that is understandable and usable by the handset operator.

In one embodiment of the invention, a method for displaying the location of a wireless handset is provided. The method comprises the steps of receiving a request from a user of the handset to display the handset location; acquiring the handset location; sending the handset location from the handset to a Web server; processing the handset location to generate a street address; sending the street address from the server to the handset; and displaying the street address on a display of the handset.

In another embodiment of the invention, a method for displaying the street address of a mobile phone is provided. First, a request is received from a user of the handset to display the mobile phone location. Next, the current latitude and longitude of the mobile phone is acquired and appended to the URL address of a Web server. A Web browser contained within the phone is navigated to the URL address, and the server at the address parses the latitude and longitude from the URL address and performs reverse geocoding on the parsed latitude and longitude to generate the street address of the mobile phone. The street address is sent from the server to the mobile phone and displayed on the mobile phone.

In an additional embodiment of the invention, a method for presenting the current street address of a wireless communications device on a display of the device is provided. The current latitude and longitude of the device is acquired and sent to a Web server. The Web server reverse geocodes the latitude and longitude to generate the street address of the device, and sends the street address from the server to the device for display.

In a further embodiment of the invention, a method for using an Internet browser to display the street address of a wireless handset incorporating the browser or to dial a telephone number is provided. An input is first received from a user of the wireless handset. The input comprises either a location request or a telephone number to be dialed. If the input is a telephone number, the browser is terminated and the telephone number is dialed. If the input is a location request, the current latitude and longitude of the handset is acquired, and the browser is navigated to a reverse geocoding Web server. The server performs reverse geocoding on the latitude and longitude to generate the street address of the handset and sends the street address to the handset for display.

In a still further embodiment of the invention, a wireless communications system comprises a wireless handset and a Web server. The handset includes a transceiver for sending and receiving communications across a wireless communication network and an Internet browser configured to accept a user request for the current location of the handset. The request includes the URL address of the Web server. A position determination unit associated with the handset determines the current latitude and longitude of the handset. The Web server is in communication with the handset over the network and receives the latitude and longitude from the Internet browser. It performs reverse geocoding on the latitude and longitude to generate the street address of the handset, and sends the street address to the handset for display.

These and other aspects and embodiments of the present invention will be apparent in the following description, claims and drawings.

Brief Description of the Drawings

The present invention is described with reference to the accompanying drawings, in which like reference numerals refer to like parts.

Figure 1 is a block diagram of a wireless communication device.

Figure 2 is a block diagram of a wireless communication system according to the present invention.

Figure 3 is a flowchart of a method for requesting information across a wireless network according to the present invention.

Figure 4 is a diagram of a handset display depicting a sample set of HDML/WML interface cards for dialing a telephone number.

Figure 5 is a diagram of a handset display depicting a set of HDML/WML interface cards for sending local information from a wireless handset to a Web server.

Figure 6 is a flowchart of a method for sending information across a wireless network to a Web server according to the present invention.

Figure 7 is a flowchart of a method for receiving latitude and longitude information embodied in an information request and returning a street address in response to the request.

Figure 8 is a diagram of a handset display depicting a set of HDML/WML interface cards for receiving the street address of a wireless communications device.

Detailed Description of Preferred Embodiments

1. Introduction and Overview

The present invention provides a system and method for displaying the current location of a wireless communications device. In response to a request for current location, the wireless device acquires its current location, typically in longitude and latitude format, and sends it to a remote server capable of performing reverse geocoding on the longitude and latitude information. The server performs reverse geocoding and generates the corresponding street address, which is sent to

the wireless device for display.

2. Example Environment

Before describing the invention in detail, an example environment in which the invention can be implemented will be described. One example environment is a handset or communication device operating within a wireless communication network such as, for example, a cellular, GSM, PCS or radio communication network. One example wireless communication device (handset) 100 is illustrated in **Figure 1**. Wireless communication devices embodying the present invention, however, can be implemented in various configurations and architectures. Implementation of the invention is not dependent on any particular device architecture or communication network.

Handset 100 includes processor 104, speaker 106, display 108, keypad 110, transceiver 122, memory 114, microphone 116, power source 118 and antenna 120. Handset 100 is typically a mobile unit such as a handheld cellular phone or an integrated vehicle phone. It is configured to communicate with other communications devices such as base station 112. Base station 112 is located within a geographic area known as a "cell" and handles communications for all mobile units within the cell.

Processor 104 directs the overall operation of handset 100. A computer program or set of instructions is typically coded or otherwise implemented on the processor to enable the processor to carry out the device operation. As will be described in more detail below, an Internet or World Wide Web ("Web") browser may be coded into the processor and used as the operating system for handset 100. Memory 114 interfaces with processor 104 and may store program code and provide storage space for data useful in executing the program code and carrying out handset functions. Memory 114 may be implemented as Read Only Memory ("ROM"), Random Access Memory ("RAM") or as any other convenient memory format. The features and functionality of the invention

described below may be implemented using hardware, software or a combination of hardware and software. If implemented as software, the software may run on processor 104 or be stored in memory 114.

Transceiver 122 includes a transmitter that transmits voice and data information via antenna 120 to a recipient communication device (such as base station 112), and a receiver that receives voice and data information from a transmitting communication device (such as base station 112). User interface features include speaker 106, display 108, keypad 110 and microphone 116. Microphone 116 accepts voice or other audio information from the user and converts this information into electrical signals that can be transmitted by transceiver 122. Likewise, speaker 106 converts electrical signals received by transceiver 122 into audio information that can be heard by a user of device 100. Display 108 displays information such as call information, keypad entry information, signal presence and strength information, battery life information, and other useful information. Display 108 preferably takes the form of a liquid crystal display ("LCD"), which has low power consumption characteristics, but could also be implemented as a light emitting diode ("LED") display or any other appropriate visual indicator. Keypad 110 typically includes an alphanumeric keypad and special function keys. It may be backlit to permit viewing of the keys in low light or dark conditions. A flip panel (not shown) may conceal all or a portion of keypad 110.

Power source 118 provides power to device 100. It may be implemented with rechargeable batteries, such as NiCad or NiMH rechargeable batteries, or with any other suitable power source.

3. Wireless Services Through a Web Server

Figure 2 is a block diagram illustrating a wireless communication system according to the present invention. The communication system provides information to a wireless handset based on the location of the device. It includes a wireless handset 130 and a hands-free unit 132 incorporating

a position determination system 134. Handset 130 can be implemented in a configuration similar to that of handset 100 of **Figure 1**, or in any other device configuration that is capable of communicating with remote locations via a wireless communication medium. In the description below, "handset" refers to any communication device capable of communicating with other devices via a wireless medium.

Hands-free unit 132 is optionally provided to allow the user of handset 130 to communicate in a hands-free mode. Hands-free unit 132 may include a microphone and speaker to provide handset 130 with speakerphone-like capabilities. Such capabilities are particularly desirable where handset 130 is utilized in an automobile or other mobile situation. In one implementation, hands-free unit 132 is configured according to conventional industry standards for a "hands-free kit".

As mentioned above, hands-free unit 132 is preferably equipped with a position determination system 134 that determines the location of hands-free unit 132 and handset 130. Position determination system 134 could also be directly incorporated into handset 130. System 134 determines location in terms of parameters such as latitude, longitude, height, speed of travel, and other useful location or position parameters. In one implementation, position determination system 134 uses the Global Positioning System ("GPS") or differential GPS, the operation of which is well known to those of ordinary skill in the art. Alternative position determination systems, such as triangulation systems, may also be used.

Handset 130 preferably includes both a voice and data interface, particularly where position determination system 134 is incorporated in hands-free unit 132. The voice interface provides hands-free operation and speakerphone-like capabilities. The data interface allows location information obtained by system 134 to be provided to handset 130 for transmission over wireless network 140.

Handset 130 communicates with other entities via wireless network 140. Network 140 is typically comprised of a plurality of base stations that provide relay points for communication. Network 140 may be a cellular, PCS, GSM, or any other wireless communication network. In addition to conventional communication with other wired or wireless communication devices, as shown in **Figure 2**, network 140 permits communication between handset 130 and data server(s) 136. When a user requests information, handset 130 provides the location of the handset to server 136 across wireless network 140. Server 136 retrieves relevant information from an associated database 138 and conveys the information to handset 130 over wireless network 140. The information may be displayed on the handset display or audibly rendered via speech synthesis or prerecorded scripts. Although the type of information stored in database 138 is virtually limitless, several example applications are provided for illustrative purposes.

In one example application, driving directions to a destination address are provided to handset 130. The handset user requests driving directions to the destination, and the handset relays the request to server 136 over wireless network 140. At the time of the request, the handset location is also provided to server 136 to provide a starting point for the directions. Using the handset location and the destination address, server 136 calculates a route and compiles driving directions. The driving directions are transmitted to handset 130 over network 140 and are displayed or audibly rendered to the user. In addition to textual driving directions, a map showing the route may be displayed on the handset display. Options such as the shortest possible route, interstate route, safest route, most scenic route, etc. may be provided. The user's choice of options will dictate the route calculation. The options may be stored locally and prompts or scripts generated in the memory of handset 130. Alternatively, the options, prompts and scripts may be stored at server 136 and provided to the user via network 140.

Another example application locates particular types of businesses or services in the user's location. Restaurants, gas stations, hotels and other businesses or services near the user's location can be identified and provided to the user. Again, the user requests the business or service type vocally or via keypad entry. The request is communicated to server 136 over wireless network 140, along with the user's current location as determined by the position determination system 134. Server 136, based on the handset location and user request, retrieves and returns relevant information to handset 130 over network 140.

Parameter limits or filters may be implemented to refine the request and selections returned. The user may set a location filter, for example, that requires returned selections be within a certain maximum number of miles of the user's current location. If the user is seeking a restaurant, the user may request or be prompted to select parameters that refine the search results. These parameters may include cuisine type (e.g., Italian, French, American, etc.), restaurant type (e.g., fast food, casual dining, formal, etc.), price range and so on. Additionally, for restaurants, gas stations, motels and other businesses, the user may identify a preferred national or regional chain. Alternatively, the user may have a preferences profile stored in the Web server 136 that contains this information.

As noted above, the search may be refined (the query narrowed) on the user's own initiative or based on system prompts. If the user simply requests a nearby restaurant, for example, server 136 may prompt the user with questions about parameters such as those described above. Alternatively, to conserve bandwidth over network 140, prompts can be stored locally and made by handset 130 (or hands-free unit 132) before the request is sent to server 136. In this embodiment, updated scripts and/or prompts may be downloaded from server 136 to handset 130. Preferably, memory-intensive data such as establishment locations, driving directions, etc. are stored in database 138 to minimize the amount of memory required in handset 130. The precise distribution of data storage among these

devices will be influenced by factors such as available bandwidth, memory costs and airtime costs.

A method for requesting information across network 140 is illustrated in **Figure 3**. In step 202, a user initiates a request for information. In step 204, the system determines whether the request requires the handset location or position. If position information is required, the method proceeds from step 204 to step 212, where system 134 acquires the position of handset 130. If system 134 is situated in hands-free unit 132, unit 132 provides the position data to handset 130 for transmission to server 136 over wireless network 140 (step 214). If position information is not required, the method proceeds from step 204 directly to step 206.

In step 206, handset 130 sends the request to server 136 via wireless network 140. The request includes any position data acquired in steps 212-214. The present invention provides a novel method for sending the local information included in the request using an HDML/WML browser that will be described in more detail below. In step 208, server 136 retrieves the data or information requested from database 138 and communicates the data to handset 130 over network 140. In step 210, the data is displayed or provided to the user.

As described above, scripts or prompts may be provided to the user to refine the information request. If the scripts or prompts are stored in database 138 (as opposed to local storage in handset 130), they are retrieved by server 136 in step 208 and provided to the user in step 210. The user's answers to the prompts are sent by handset 130 to server 136, which uses the refined information to retrieve additional data or information from database 138, or to further refine the user's query. This potentially repetitive process is illustrated in **Figure 3** by flow line 222 and the repetition of steps 202, 206 and 208.

4. Sending Local Handset Information to a Web Server

As noted above, the present invention provides a novel method for sending local handset

information to a Web server using a wireless browser. A browser, as is well known to those of ordinary skill in the art, is a software application that is used to locate and display Web pages. In one implementation, an HDML/WML browser is used as the handset operating system and handset functions are accessed through the browser. The browser presents a list of options to the user such as, for example, accessing a phone list, accessing an inbox, and so on. In accordance with the present invention, one of the presented options is use of a Web service that requires local information from the handset, such as the location of the handset. The local information is sent to a Web server by the browser by modifying the phone dialing process such that the local information is sent as part of the URL (Uniform Resource Locator).

To provide a backdrop for the present invention, the process for instructing the handset to dial a number from a launched wireless browser will first be described. First, the user launches the wireless browser. At some point during browser operation, the user provides the browser with a telephone number to be dialed. The telephone number to be dialed will be referred to as the NUMBER input field. The NUMBER field may be acquired in a variety of ways. A user may directly input the number to be dialed into the handset keypad, or may input a unique identifier that enables the number to be retrieved from memory. Alternatively, the number to be dialed may be acquired via an alphabetical search of a database of contacts maintained in the handset memory. Once the NUMBER field is acquired, the web browser displays the number on the handset display and asks for affirmation from the user that the displayed number is the number that should be dialed. The user may affirm the displayed number by selecting an "OK" option, pressing an "OK" button or the like. Once the user has affirmed the number to be dialed, the browser executes a "Call" function using the telephone number as the variable input. At this point, the handset ends the browser application and initiates the dialing process.

As noted above, HDML/WML uses a "card and deck" organizational structure whereby all information is organized into a collection of screen sized cards, each of which specifies a single interaction between the handset and user. **Figure 4** depicts a sequence of HDML/WML user interface cards 230 and 235 as displayed to the user during the dialing process described above. First interface card 230 displays the number that the user wants to dial ("858-555-1212") and requests affirmation from the user ("OK"). Second interface card 235 displays the status of handset 100 during the connection process as well as the telephone number that the handset is attempting to connect with. An example of an HDML/WML code section associated with card 230 is set forth below:

```
<HDML VERSION=3.0>
      <DISPLAY>
            <ACTION TYPE=ACCEPT LABEL=OK TASK=CALL NUMBER=858-555-1212>
            Dial Number
            <BR>858-555-1212
      </DISPLAY>
</HDML>
```

The first line of code defines the header of the HDML deck. All HDML decks must begin with an <HDML> tag and end with an </HDML> tag (line 6). The second line of code defines the header of the display card. Like HDML decks, cards require beginning (<DISPLAY>) and ending tags (</DISPLAY>). The third line of code defines an action, which specifies what the handset should do when the user presses a specified function key. The TYPE=ACCEPT portion identifies the function key, in this case the ACCEPT key, and the LABEL=OK portion instructs the browser to apply an "OK" label to the ACCEPT key, thereby inviting the user to press the ACCEPT key in order to proceed.

The TASK=CALL specifies what the handset should do when the user presses the ACCEPT key, in this case, switch the handset to voice mode and call the number specified in the NUMBER option, which is NUMBER=858-555-1212.

Lines 4 and 5 provide the text that is displayed on the handset display (card 230). "Dial Number" is displayed in a first text line, and "858-555-1212" is displayed in a second text line. The
 command preceding line 5 instructs the browser to start a new line of text. The "OK" text appears because of the LABEL=OK portion of line 3. When the handset user presses the ACCEPT button to accept the "OK" option on card 220, the HDML/WML browser executes the "Call" task, using the 858-555-1212 telephone number as a variable input. The browser application is terminated and the phone number is dialed. In this fashion, a user is able to dial a phone number directly from the HDML/WML browser.

The present invention modifies this existing HDML/WML infrastructure to permit local information to be sent from the handset to a Web server using the browser. **Figure 6** is a flowchart illustrating a method 250 for sending local information to a Web server from a wireless handset. In the context of the method for requesting information across a wireless network 140 illustrated in **Figure 3**, method 250 would be carried out in step 206.

In step 252, the handset user launches the wireless browser application. In an implementation where the browser acts as the handset operating system, step 252 may occur automatically (without user action). In step 254, the user selects either a web service or a telephone number to be dialed. The user's selection is entered into the variable input portion of the NUMBER=xxxx instruction in the HDML/WML code set forth above. Where a telephone number to be dialed is selected, the telephone number is inserted into the NUMBER field. Where a web service is selected, a local information type indicator, followed by the URL, is entered into the number field.

"GPS", for example, may be used to indicate that local information comprising the location of the handset is required. Hence, if the user selects a browser option such as "Display my Current Location", the browser may enter "GPShttp://www.myaladdin.com/NP?" into the NUMBER field, wherein "GPS" indicates the local information type required, and "http://www.myaladdin.com/NP?" is the URL address.

At decision node 256, the handset determines whether the user has selected a Web service requiring local information or a telephone number to be dialed. In one implementation, the browser accomplishes this by determining whether the NUMBER variable input has an information type field (i.e., "GPS"). In another implementation, the browser may determine whether the NUMBER variable input includes a URL address. If the user has selected a number to be dialed, the method proceeds to step 258 and the browser dials the number as described above. The "Call" function is executed to terminate the browser and dial the phone number.

If, at node 256, the handset determines that the user has selected a Web service requiring local information, the method proceeds to step 260. In step 260, the browser acquires the local information necessary to carry out the request. If the service requested is the user's current location, for example, the browser will acquire the current GPS data from position determination device 134. Other types of local information may include user preferences, schedule, contact information and so on. In step 262, the handset extracts the URL from the service request (the NUMBER input). Typically, the URL will be the address of a Web server that will carry out the information request. The local information acquired by the browser is appended to the URL address in step 264 and, in step 266, the handset instructs the browser to go to the URL address rather than terminating the browser and dialing the number in the NUMBER field. Where the handset location has been requested, for example, the URL address with local information appended may be "http://

myaladdin.com/NP?long=111.1111&lat=222.2222&time=<string(URL encoding format)>". Hence, the browser is able to proceed to the server addressed by the URL and provide the server with the local information (appended to the URL) that is necessary to carry out the request. Once the server has the local information, it will carry out the request and communicate the results to the handset (steps 208 and 210 of **Figure 3**).

An example of an HDML/WML code section associated with displaying a card 240 (**Figure 5**) for the Web service "Where am I?" is set forth below:

```
<HDML VERSION=3.0>
        <DISPLAY>.
                <ACTION TYPE=ACCEPT LABEL=OK TASK=CALL NUMBER=GPShttp://www.myaladdin.com/NP?>
                Service
                <BR>Where am I
        </DISPLAY>
</HDML>
```

As can be seen, this code section is similar to the code section for the dialing of a phone number. The variable NUMBER field in the third line, however, is the URL address of a server preceded by an information type field. This will indicate to the handset that rather than terminating the browser and dialing the number, it should acquire the local information, append it to the URL, and proceed to the URL (steps 260-266 of method 250). The fourth and fifth lines of code display text associated with the locator service, rather than the dial number function.

5. Returning the Street Address for Display on the Handset

Once the server has acquired the local information necessary to carry out a request (as described above), the server performs any necessary processing and supplies a response to the handset. In one embodiment, where the service requested is the current location of the handset,

latitude and longitude information is appended to the URL. In this embodiment, described in more detail below, the Web server performs a reverse geocoding process on the extracted latitude and longitude data and sends the street address to the handset for display.

Figure 7 depicts a method for converting latitude and longitude data embedded in a service request from a wireless handset into a street address for transmission to and display on the handset. The method begins where the method of **Figure 6** leaves off: a user has selected a current location option (step 256); local information consisting of the current latitude and longitude of the handset has been acquired (step 258) and appended to the URL (steps 260-262); and the browser has navigated to the URL with the appended location data. As mentioned above, a position determination system (134) associated with handset 130 determines the latitude and longitude of the handset. The position determination system may be part of a hands-free unit (132) associated with the handset, or it may be directly incorporated into handset 130. It may use GPS or a suitable alternative, such as a triangulation system.

In step 270 (**Figure 7**), the server at the destination URL receives the service request. In step 272, the server parses out the longitude and latitude information that was appended to the URL in the service request. The URL address with local information appended may be in a form such as, for example, "http:// myaladdin.com/NP?long=111.1111&lat=222.2222&time=<string(URL encoding format)>". After the longitude and latitude data is parsed, the Web server performs a reverse geocode process (step 274) to determine the corresponding street address for the latitude and longitude. Reverse geocode processes by a street address is obtained from latitude and longitude data are well known to those of ordinary skill in the art. In an alternative embodiment, the Web server may send the latitude and longitude data to a separate, independent reverse geocode server (not pictured) for processing. This outsourcing of the reverse geocode processing would be

incorporated in step 274 of **Figure 7**. Once the Web server has the street address corresponding to the latitude and longitude data, it is sent to the handset that initiated the request (step 276) and the handset displays the address to the user (step 278).

Figure 8 depicts a sequence of HDML/WML user interface cards 280 and 285 that might be displayed on the handset during the street address location service. Card 280 allows the user to select the "Where am I" service by selecting "OK" to initiate the service. Once the user has selected "OK", the handset proceeds to obtain latitude and longitude data and appends it to a service request as described above. This information is sent to an appropriate server and reverse geocoded to a street address that is sent to the handset. Card 285 depicts the display of the street address as seen by the user, along with an "OK" prompt to proceed. It should also be noted that, if desired, the raw latitude and longitude data (card 245 of **Figure 5**) may be displayed to the user while the street address is being obtained by the server (after card 280 but before card 285).

The system and method described above may be implemented as computer programs, software or hardware or a combination of hardware and software, and may be implemented in a computing system having one or more processors. The HDML/WML code that controls the wireless web browser, for example, may be coded in processor 104 or stored in memory 114. Alternatively, the program or portions of it could be stored on server 136 and downloaded to handset 130 as needed.

Various embodiments of a system and method for sending local information from a wireless communications device to a web server have been described herein. These embodiments are presented for exemplary purposes only, however, and are not intended to limit the scope of the invention, which is defined by the following claims and their equivalents.

Claims

1. A method for displaying the location of a wireless handset comprising the following steps:

receiving a request from a user of the handset to display the handset location;

acquiring the handset location;

sending the handset location from the handset to a Web server;

processing the handset location to generate a street address;

sending the street address from the server to the handset; and

displaying the street address on a display of the handset.

2. A method as claimed in claim 1, wherein the handset location is acquired as latitude and longitude by a GPS unit associated with the handset.

3. A method as claimed in claim 1, wherein the handset location is acquired as latitude and longitude by triangulation.

4. A method as claimed in claim 1, wherein the handset location is appended to the URL address of the Web server, and wherein the browser comprises a wireless browser that navigates to the URL address.

5. A method as claimed in claim 4, wherein the server parses the handset location from the URL address and performs reverse geocoding on the extracted location to generate the street address.

6. A method as claimed in claim 1, wherein the server performs reverse geocoding on the handset location to generate the street address.

7. A method as claimed in claim 1, wherein the street address is displayed on the display as part of a HDML/WML user interface card.

8. A method for displaying the street address of a mobile phone comprising the following steps:

receiving a request from a user of the handset to display the mobile phone location;

acquiring the current latitude and longitude of the mobile phone;

appending the latitude and longitude to the URL address of a Web server, and navigating a Web browser contained within the phone to the URL address;

parsing the latitude and longitude from the URL address at the server and peforming reverse geocoding on the parsed latitude and longitude to generate the street address of the mobile phone;

sending the street address from the server to the mobile phone; and

displaying the street address on a display of the mobile phone.

9. A method for presenting the current street address of a wireless communications device on a display of the device comprising the following steps:

acquiring the current latitude and longitude of the device;

sending the latitude and longitude to a Web server;

reverse geocoding the latitude and longitude at the Web server to generate the street address

of the device;

sending the street address from the server to the device; and

presenting the street address on the display of the device.

10. A method as claimed in claim 9, wherein the latitude and longitude is acquired from a position determination system selected from a group comprising a GPS system and a triangulation system.

11. A method as claimed in claim 10, wherein the latitude and longitude of the wireless device are appended to the URL address of the Web server.

12. A method for using an Internet browser to display the street address of a wireless handset incorporating the browser or to dial a telephone number comprising the following steps:

(a) receiving an input from a user of the wireless handset, wherein the input comprises either a location request or a telephone number to be dialed;

(b) determining whether the input comprises a location request or a telephone number;

(c) if the input is a telephone number, terminating the browser and dialing the telephone number; and

(d) if the input is a location request, acquiring the current latitude and longitude of the handset, navigating the browser to a reverse geocoding Web server, performing reverse geocoding on the latitude and longitude to generate the street address of the handset, and sending the street address to the handset for display on the handset display.

13. A method as claimed in claim 12, wherein the browser is an HDML/WML browser.

14. A method as claimed in claim 12 wherein in step (a), if the input is a telephone number, the telephone number is inserted into a NUMBER field following an HDML/WML CALL command, and if the input is a location request, a location request indicator and the URL address of the Web server is inserted into a NUMBER field following the HDML/WML CALL command.

15. A method as claimed in claim 14, wherein step (b) comprises determining whether the NUMBER field includes a location request indicator.

16. A method as claimed in claim 14, wherein step (b) comprises determining whether the NUMBER field includes a URL address.

17. A method as claimed in claim 14, wherein step (d) comprises extracting the URL address from the NUMBER field and appending the latitude and longitude to the URL address, and navigating the browser to the URL address.

18. A method as claimed in claim 14, wherein the location request indicator is "GPS", and wherein the latitude and longitude is acquired from a GPS receiver.

19. A wireless communications system comprising:

a wireless handset comprising a transceiver for sending and receiving communications across a wireless communication network; an Internet browser configured to accept a user request for the

current location of the handset, wherein the request includes a URL address; and a position determination unit for determining the current latitude and longitude of the handset in response to the user request; and

a Web server located at the URL address contained in the user request and in communication with the handset over the network, the Web server receiving the latitude and longitude from the Internet browser, performing reverse geocoding on the latitude and longitude to generate the street address of the handset, and sending the street address to the handset for display.

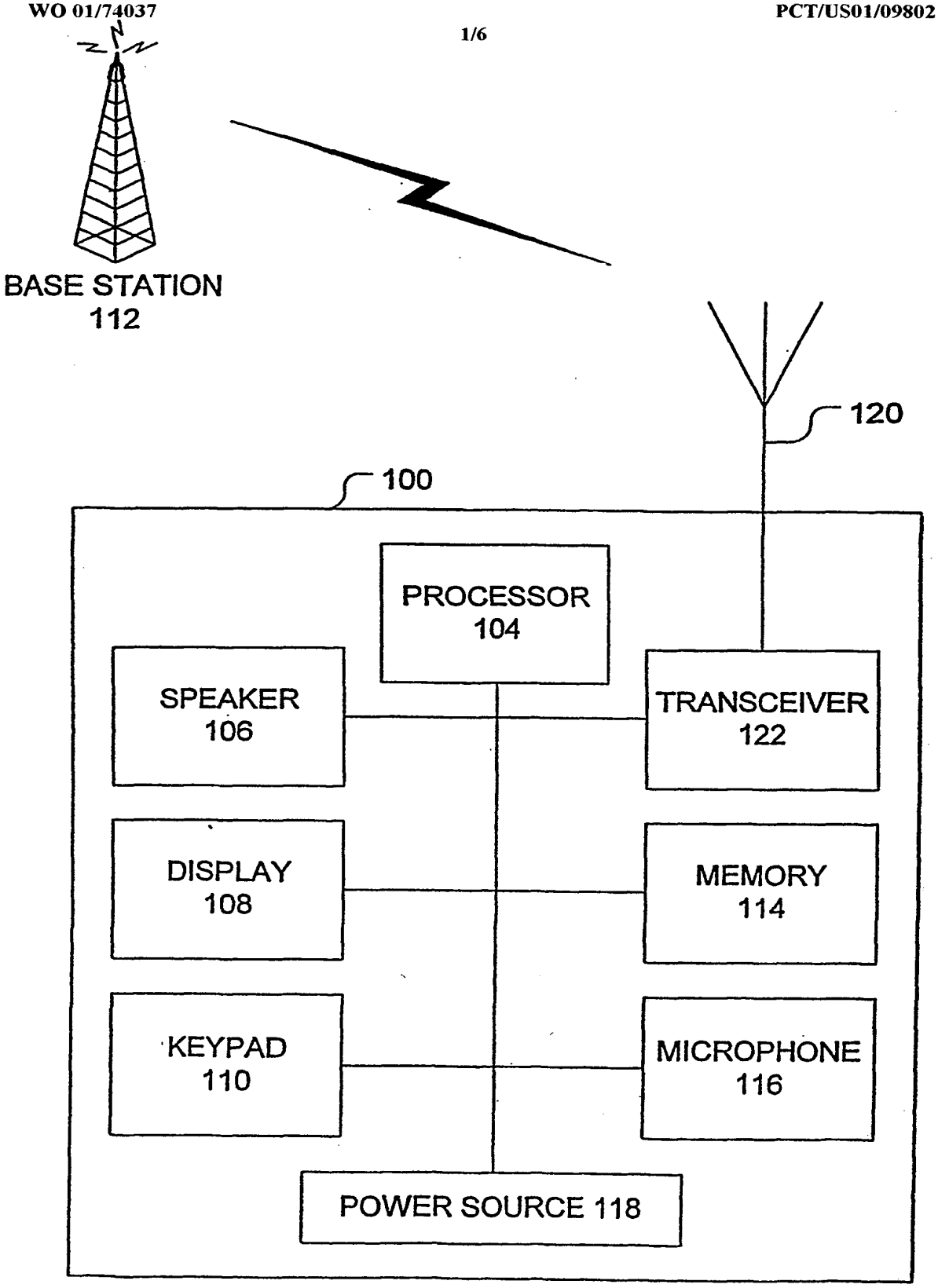
BASE STATION
112
120
100
PROCESSOR
104
SPEAKER
106
TRANSCEIVER
122
DISPLAY
108
MEMORY
114
KEYPAD
110
MICROPHONE
116
POWER SOURCE 118

Fig. 1

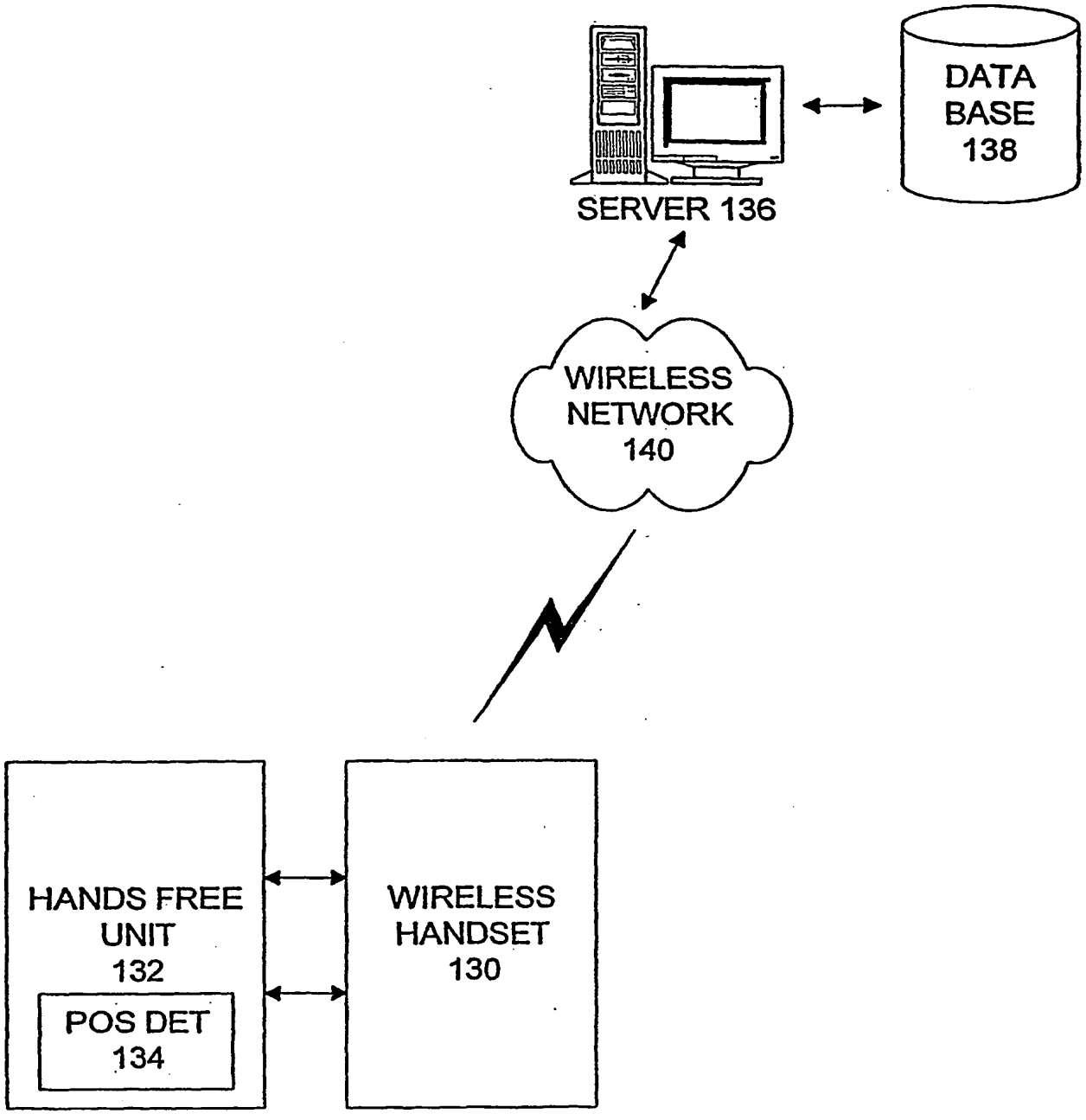
DATA
BASE
138
SERVER 136
WIRELESS
NETWORK
140
HANDS FREE
UNIT
132
POS DET
134
WIRELESS
HANDSET
130

Fig. 2

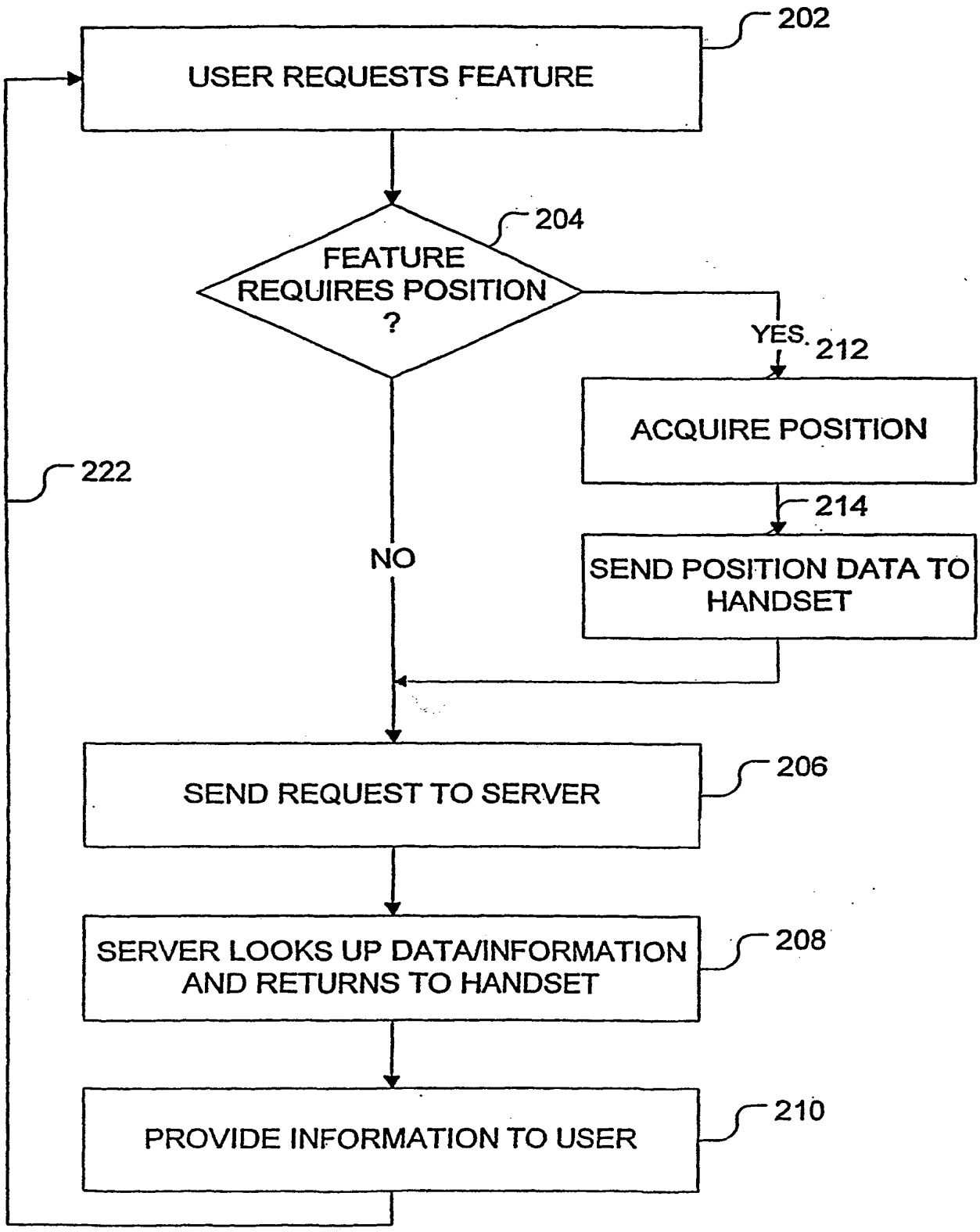

Fig. 3

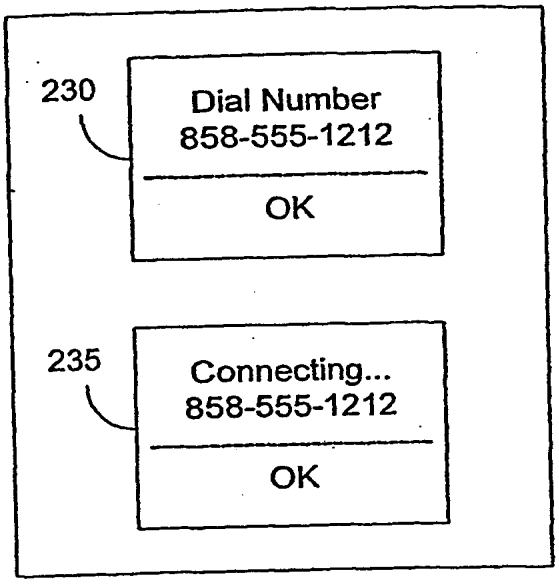

Figure 4

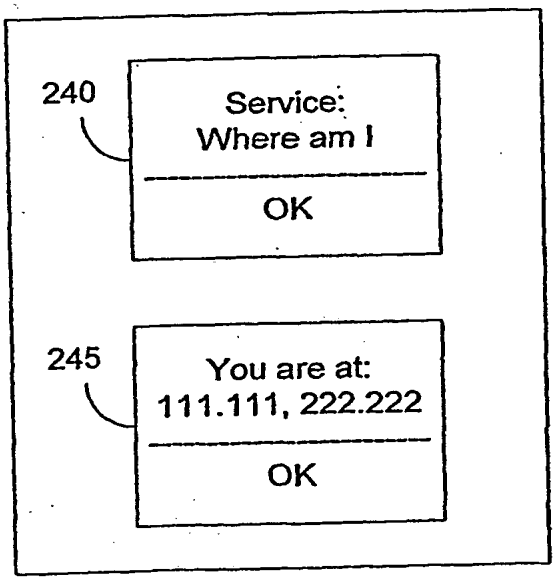

Figure 5

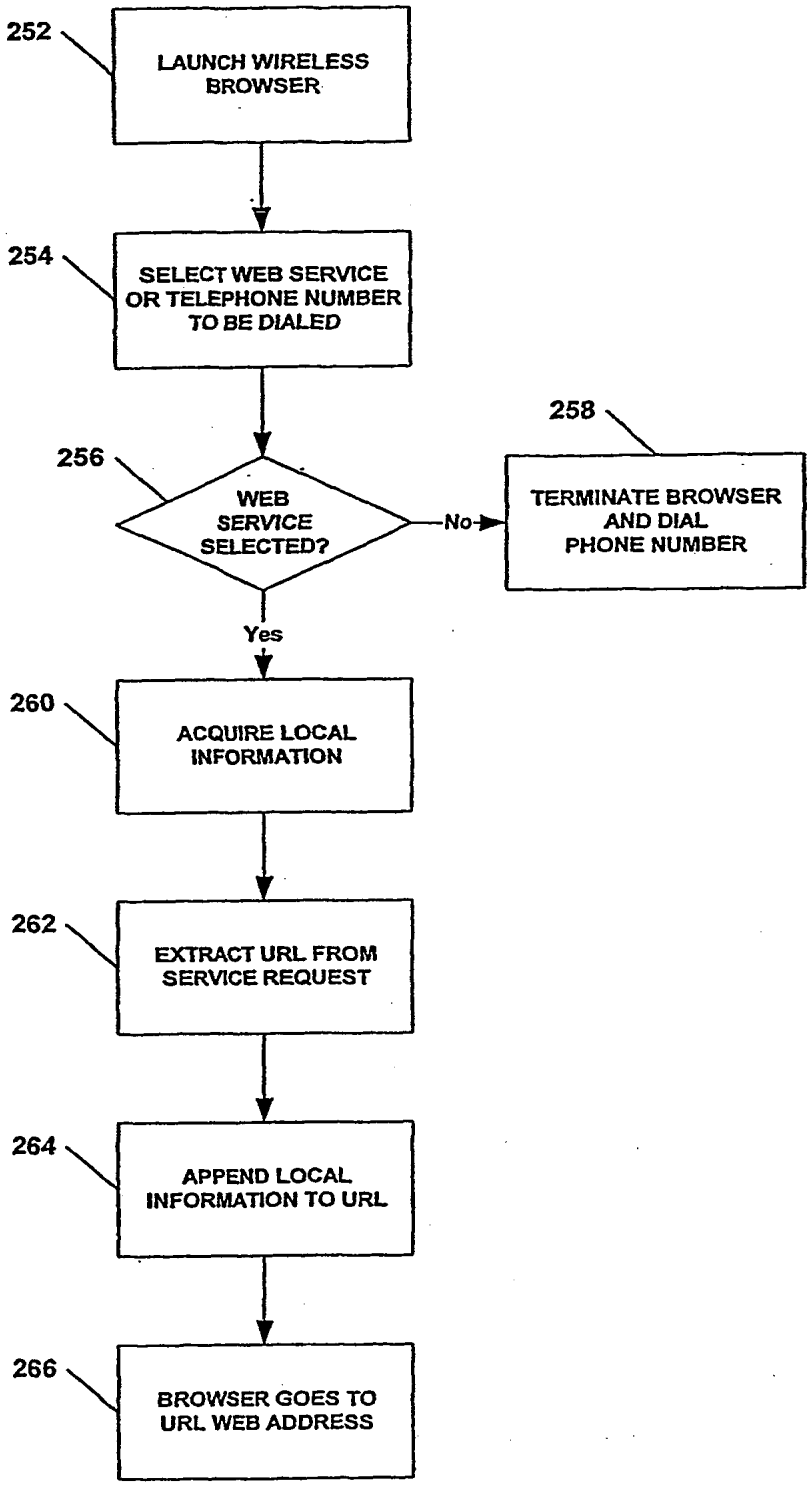
252
LAUNCH WIRELESS BROWSER
254
SELECT WEB SERVICE OR TELEPHONE NUMBER TO BE DIALED
256
WEB SERVICE SELECTED?
No
258
TERMINATE BROWSER AND DIAL PHONE NUMBER
Yes
260
ACQUIRE LOCAL INFORMATION
262
EXTRACT URL FROM SERVICE REQUEST
264
APPEND LOCAL INFORMATION TO URL
266
BROWSER GOES TO URL WEB ADDRESS

Figure 6

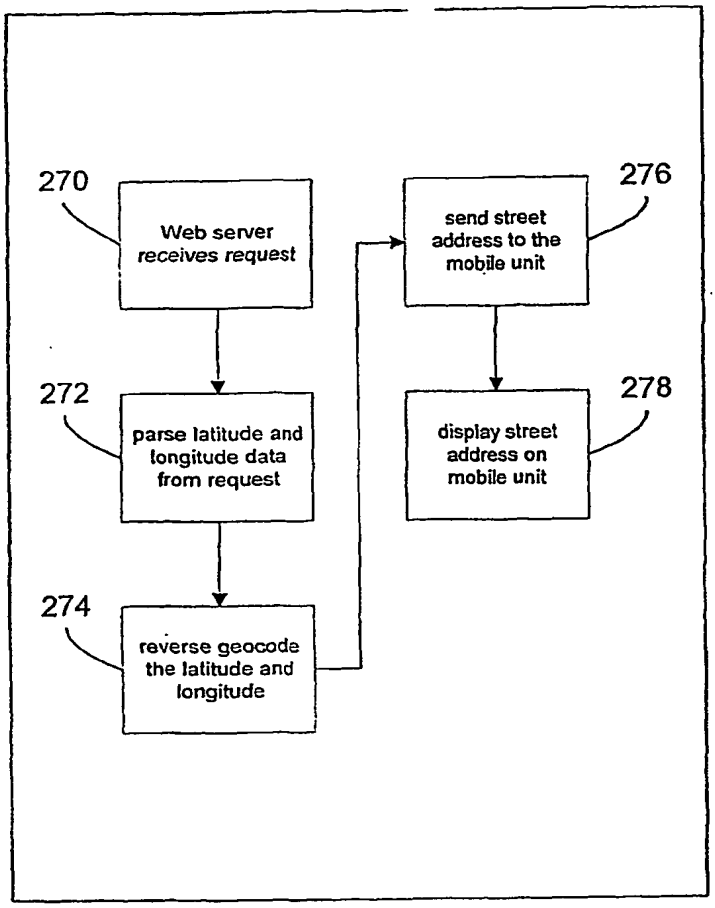
270
Web server receives request
272
parse latitude and longitude data from request
274
reverse geocode the latitude and longitude
276
send street address to the mobile unit
278
display street address on mobile unit

FIG. 7

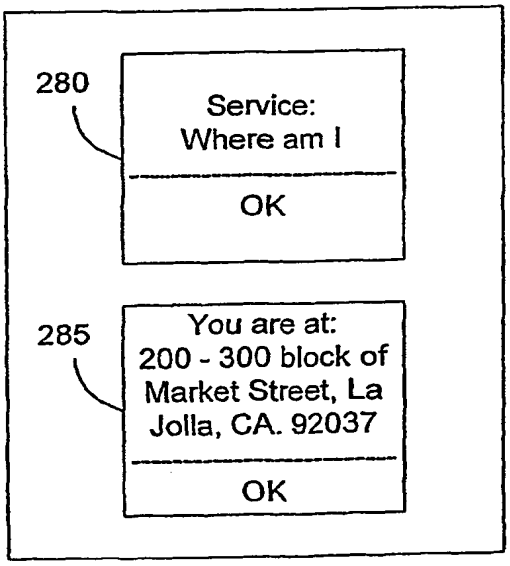
280
Service:
Where am I
OK
285
You are at:
200 - 300 block of
Market Street, La
Jolla, CA. 92037
OK

FIG. 8

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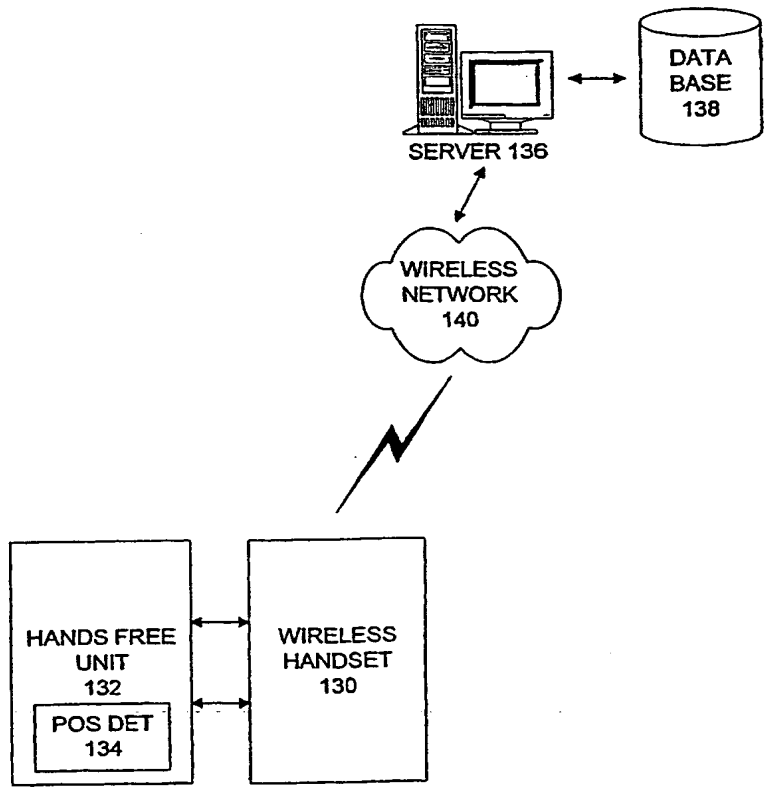
[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR DISPLAYING THE LOCATION OF A WIRELESS COMMUNICATIONS DEVICE



(57) Abstract: A system and method for displaying the current street address on the display (108) of a mobile wireless communications device (100). The longitude and latitude of the device is determined by a system such as GPS and triangulation. This information is appended to the URL of a web server (136), and a browser contained within the wireless device navigates to the server. The server (136) performs reverse geocode processing on the longitude and latitude to compute the corresponding street address.

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International application No.
PCT/US01/09802

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US CL :US CL 455/457
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : US CL 455/457

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST 2.0

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,959,577 A (FAN et. al.) 28 September 1999, col. 3 lines 11-46	1-19
Y	US 5,625,668 A (LOOMIS et al.) 29 April 1997, col. 3 line 55 to col. 4 line 6	1-19
A	US 5,841, 396 A (KRASNER) 24 November 1998, all	1-19
A,P	US 6,150,980 A (KRASNER) 21 November 2000, all	1-19
A	US 5,913,170 A (WORTHAM) 15 June 1999, all	1-19

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*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
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Date of the actual completion of the international search	Date of mailing of the international search report
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